

Application Serial No. 10/734,108
Amendment dated July 19, 2005
Reply to Office action of April 18, 2005

REMARKS

Claims 1 through 6 are pending in this application. Claim 1 is amended herein. Claims 7 through 17 are cancelled herein, without prejudice or disclaimer. Reconsideration is requested based on the foregoing amendment and the following remarks.

Claim Rejections - 35 U.S.C. § 103:

Claims 1, 3, 5, and 6 were rejected under 35 U.S.C. § 103 as being unpatentable over Shibata et al., US 6,478,075 in view of Brinegar et al., US 4,832,112. The rejection is traversed. Reconsideration is earnestly solicited.

Claim 1 recites:

"a stirring unit which applies to the sleeve an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal."

Neither Shibata nor Brinegar teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve *before* the completion of loading of molten metal, as recited in claim 1. Since neither Shibata nor Brinegar teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve before the completion of loading of molten metal, their combination cannot, either.

In particular, in the claimed invention, an electric field having an intensity which does not cause dendritic particles to be created in molten metal is applied to a sleeve. Since the electromagnetic field is applied to said sleeve before the completion of the loading of molten metal, the molten metal has a uniform temperature throughout, i.e., at the inner wall, center region, and upper and lower regions of the sleeve, and a temperature difference does not occur in the Molten metal loaded in to the sleeve. As a result, initial solidification layers, i.e., dendrites, are not generated in the molten metal near the inner wall of the sleeve, and thus, latent heat due to the formation of dendrites is not generated.

Therefore, the present invention does not take the latent heat from the molten metal, which is about 400 times greater than the specific heat of the molten metal, and thus it is able to cool the molten metal by taking only an amount of heat equivalent to the specific heat from the molten metal. As a result, the entire molten metal in the sleeve can be cooled down rapidly

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below its liquidus temperature, thereby enabling simultaneous formation of numerous crystal nuclei.

Shibata, in contrast, only discloses a die casting method comprising loading molten metal into a casting sleeve 2 in the state where a lower opening of the casting sleeve 2 is clogged by a plunger tip 5; cooling the casting sleeve 2 so that the molten metal forms primary crystals; and simultaneously electromagnetic agitating the molten metal through use of high frequency coil 6 so that the molten metal is fluidized and soaked and the primary crystals is spheroidized.

Similarly, Brinegar is only for removing nonmetal impurities. Since the nonmetal impurities have a greater specific gravity than molten metal Brinegar makes the impurities rise up to the surface of a molten metal by induction heating which is generated by an electromagnetic field and is applied to the molten metal prior to the loading of the molten metal into a vessel, hereby removing the impurities that rise up to the surface of the molten metal.

Thus neither Shibata nor Brinegar disclose the characteristics of claim 1 which are (1) a stirring unit which applies to the sleeve an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal, (2) wherein said sleeve is loaded with molten metal in the state where said electromagnetic field is applied. Therefore, the above-mentioned effects of the present invention cannot be achieved by combining Shibata and Brinegar. Claim 1 is submitted to be allowable. Withdrawal of the rejection of claim 1 is earnestly solicited.

Claims 3, 5, and 6 depend from claim 1 and add further distinguishing elements. Claims 3, 5, and 6 are thus also submitted to be allowable. Withdrawal of the rejection of claims 3, 5, and 6 is also earnestly solicited.

Claim 2 was rejected under 35 U.S.C. § 103 as being unpatentable over Shibata in view of Brinegar, and further in view of Dautre et al., U.S. 6,428,636. The rejection is traversed. Reconsideration is earnestly solicited.

Claim 2 depends from claim 1 and add further distinguishing elements. Neither Shibata nor Brinegar teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve before the completion of loading of molten metal, as discussed above with respect to claim 1. Dautre

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doesn't either, and thus cannot make up for the deficiencies of Shibata and Brinegar with respect to claims 3 and 4. Since neither Shibata, Brinegar nor Dautre teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve before the completion of loading of molten metal, their combination cannot, either. Claim 2 thus also submitted to be allowable, for at least the reasons discussed above with respect to claim 1. Withdrawal of the rejection of claim 2 is also earnestly solicited.

Claim 4 was rejected under 35 U.S.C. § 103 as being unpatentable over Shibata in view of Brinegar, and further in view of Nakao et al., U.S. 6,505,670. The rejection is traversed. Reconsideration is earnestly solicited.

Claim 4 depends from claim 1 and add further distinguishing elements. Neither Shibata nor Brinegar teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve before the completion of loading of molten metal, as discussed above with respect to claim 1. Nakao doesn't either, and thus cannot make up for the deficiencies of Shibata and Brinegar with respect to claim 4. Since neither Shibata, Brinegar nor Nakao teach, disclose, or suggest applying an electromagnetic field having an intensity that does not cause dendritic particles to be created in molten metal to the sleeve *before* the completion of loading of molten metal, their combination cannot, either. Claim 4 thus also submitted to be allowable, for at least the reasons discussed above with respect to claim 1. Withdrawal of the rejection of claim 4 is also earnestly solicited.

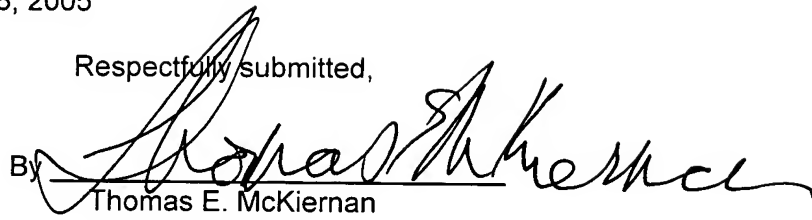
Conclusion:

Accordingly, in view of the reasons given above, it is submitted that claims 1 through 6 are allowable over the cited references. Allowance of claims 1 through 6 and of this entire application are therefore respectfully requested.

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Respectfully submitted,

By

A handwritten signature in black ink, appearing to read "Thomas E. McKiernan", is written over a horizontal line.

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